Paper No. 35

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

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Ex parte GUNMA-KEN EIICHI IINO

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Appeal No. 2003-0136
Application No. 09/229,086

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ON BRIEF

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Before WARREN, DELMENDO, and PAWLIKOWSKI, Administrative Patent Judges.

PAWLIKOWSKI, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the final rejection of claims 1 through 4.

Claim 1 is illustrative, and is set forth below:

1. A method of producing a silicon monocrystal which comprises preparing a silicon seed crystal having a sharp tip end, and melting down a part of the silicon seed crystal from a tip end to a position having a first thickness, followed by performing a necking operation to form a tapered necking part and a neck portion, and subsequently pulling a monocrystal ingot after increasing a diameter, wherein the first thickness is twice as large as the diameter of the neck portion to be formed or more; said necking operation is performed in such a way that the tapered necking part is formed at an early stage by pulling the crystal with gradually decreasing the diameter to a minimum diameter of 5 mm or more, and then a neck portion is formed,

subsequently the monocrystal ingot is pulled with increasing a diameter.

The examiner relies upon the following references as evidence of unpatentability:

Murai et al. (Murai)	5,501,172	Mar. 26, 1996
Izumi	5,932,002	Aug. 3, 1999

Claims 1-4 stand rejected under 35 U.S.C. § 103 as being unpatentable over Murai in view of Izumi.

OPINION

We have carefully reviewed the brief, reply brief, and the answer, and the evidence of record. For the reasons set forth in the answer, and below, we affirm the rejection.

Figure 1 of appellants' specification is illustrative of the subject matter set forth in appellants' claim 1. Item B in Figure 1 of appellants' specification indicates the location of the tip end of seed crystal 3 after melting, and is recited as a "first thickness" in claim 1. See page 11 at lines 17-18 of appellants' specification.

Appellants state on page 6 of the brief that the size of the diameter defined by first thickness B (the tip end of the seed crystal after melting) is not necessarily equivalent to the diameter A of the cylindrical portion of seed crystal 3. Appellants state that the only time first thickness B equals the size of diameter A is "when the entire tip end portion of the seed crystal is melted down" (brief, page 6).

Hence, appellants admit that that the size of the diameter defined by first thickness B can be the same as diameter A of the cylindrical portion of seed crystal 3 of appellants' Figure 1.

Appellants' claim 1 requires that first thickness (B) is twice as large or more than the diameter (C) of neck portion 5 See Figure 1. On pages 6-8 of the brief, appellants argue that this aspect of their claimed invention is neither shown nor suggested by Murai or Izumi.

Beginning on page 4 of the answer, the examiner rebuts and states that Murai discloses the dimensions required by appellants claims. The examiner refers to column 3, lines 55+ and column 4, lines 1-32 of Murai, and refers to Figure 1 of Murai. On page 5 of the answer, the examiner specifically states that the requirement of a first thickness as defined as being twice or more as large as the neck portion is found in column 4, lines 20-25 of Murai.[1]

We find, in column 4, beginning at line 19 of Murai, that Murai discloses that the diameter of neck B can be adjusted in the range of 0.09 to 0.9 times the sectional size of the seed crystal 2, which is depicted as item A in Figure 1. See column 6, lines 6-11. Given the fact that appellants admit that the size of the diameter defined by first thickness B can be the same as diameter A of the cylindrical portion of seed crystal 3, we also find that item A in Murai's Figure 1 can be the diameter of a first thickness as defined in appellants' claim 1. Because item A can be the claimed "first thickness", we agree with the examiner that column 4, lines 20-25 of Murai teaches a first thickness (as defined in appellants' claim) that is twice as large or more as the diameter of B shown in Murai's Figure 1.

[1] Hence, it is disputed as to whether Murai teaches or suggests melting down a part of the silicon seed crystal 2 from a tip end to a portion having a first thickness, wherein the first thickness is twice as large or more than the diameter of the neck (the diameter of the neck is depicted in appellants' figure 1 as item C; the diameter of the neck is depicted in Murai's figure 1 as item B).

Furthermore, we note that where general conditions of the appealed claims are disclosed in the prior art, it is not inventive to discover optimum or workable ranges by routine experimentation, and appellants have the burden of proving any criticality. In re Boesch, 617 F.2d 272, 276, 205 USPQ 215, 218-19 (CCPA 1980); In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). Here, Murai teaches a method of growing silicon crystals that is substantially similar to appellants' claimed method, and any optimization of respective diameters of a first thickness and a neck portion found in Murai is deemed obvious, absent evidence of criticality. See also In re Best, 562 F.2d 1252, 1255 195 USPQ 430, 433-34 (CCPA 1977).

We also have reviewed both the appellants' and the examiner's comments on Izumi. We find ourselves in agreement with the examiner's position that it would have been obvious to modify the method of Murai by utilizing a conical seed (a "sharp tip end" as recited in appellants' claim 1) in view of Izumi's teachings that the use of a conical seed helps prevent thermal shock during pulling of a single crystal, and we refer to page 4 of the answer in this regard. Appellants argue that the combination of Murai in view of Isumi is improper, *inter alia*, because Izumi does not perform a necking operation. However, Izumi's method does apply to a method of pulling a single crystal, which is the method that occurs in Murai, and therefore we determine that the combination is proper in this regard.

In view of the above, we therefore affirm the rejection.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR 1.136(a).

AFFIRMED

Charles F. Warren Administrative Patent Judge	)	
Romulo H. Delmendo Administrative Patent Judge	)	BOARD OF PATENT APPEALS AND INTERFERENCES
Beverly A. Pawlikowski Administrative Patent Judge	)	

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